

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (original) An orthopedic appliance adapted to be worn on a forearm and a hand of a person exhibiting symptoms of carpal tunnel syndrome, the appliance comprising:

a. a biasing means alignable with the ulnar side of the forearm and not with the dorsum of the forearm, the biasing means having a supporting end and a torquing end, the torquing end disposed to apply a continuous, low level force to the hand over time and in a direction encouraging dorsal glide;

b. a palmar component coupling the torquing end to the carpal-metacarpal complex of the hand, the palmar component comprising:

i. an ulnar gutter clasp having a dorsal end and a palmar end, the ulnar gutter clasp being sized and configured to the hand such that the dorsal end extends from the ulnar side of the hand to approximately the midpoint of the dorsal side of the hand and the palmar end extends from the ulnar side of the hand to approximately the midpoint of the palm;

ii. a palmar strap having a fixed end and a attachable end, the fixed end permanently secured to the palmar end of the ulnar gutter clasp, the attachable end passing from the palmar end across the thenar web between the thumb and forefinger to the dorsal end and being removably secured to the dorsal end so as to secure the ulnar gutter clasp firmly to the ulnar side of the hand, and

iii. a connection means fixedly attached to the ulnar gutter clasp at a point proximal to the ulnar side of the hand, whereby the torquing end of the biasing means is coupled to the palmar component at a point outboard of the ulnar side of the hand so as not to interfere with normal activities of daily living; and,

25           c.       a forearm component sized and configured to be rigidly and removably attached to the forearm, the forearm component providing a stable platform for the supporting end and maintaining alignment of the torquing end with the ulnar side of the carpal-metacarpal complex during movement of the forearm and hand;

          whereby contractures of the volar carpal ligaments are relieved and the cocontraction ratio is restored between the flexors and extensors of the forearm, without interfering with normal activities of daily living.

2.       (original) The orthopedic appliance described in claim 1, wherein the palmar end is confined within the area of the palm delineated by and interior to the thenar crease of the palm and the MCP joint crease of the palm.

3.       (original) The orthopedic appliance described in claim 1, wherein the forearm component comprises the following:

5           a.       a splint shell of semirigid material substantially conforming to the dorsum and sides of the forearm, the splint shell having a distal end, a proximal end, an ulnar edge between the distal end and the proximal end, a radial edge between the distal end and the proximal end, and a dorsal portion extending from the distal end to the proximal end and between the radial edge and the ulnar edge; and

          b.       a shell securing means for removably securing the splint shell to the forearm.

4.       (original) The orthopedic appliance described in claim 3, wherein the proximal end of the splint shell is recessed to permit unimpeded movement of the extensor muscle group on the dorsal side of the forearm.

5.       (original) The orthopedic appliance described in claim 3, wherein the shell securing means comprises a distal forearm strap proximate to the distal end and encircling the distal forearm to removably secure the split shell to the forearm.

6. (original) The orthopedic appliance described in claim 5, wherein the shell securing means further comprises a proximal forearm strap proximate to the proximal end and encircling the proximal forearm to removably secure the split shell to the forearm.

7. (original) The orthopedic appliance described in claim 5, wherein the shell securing means further comprises a transverse strap extending from a point on the splint shell which is proximate to the proximal end and the ulnar edge transversely across the volar forearm to a point on the splint shell which is proximate to the distal end of the radial edge, the transverse strap being releasably secured, whereby the transverse strap maintains alignment of the ulnar edge of the splint shell with the ulna of the forearm during supination and pronation.

8. (original) The orthopedic appliance described in claim 7, wherein the splint shell further comprises a radial gap extending from the radial edge a distance into the dorsal portion, the radial gap defining a proximal portion and a distal portion connected only along the ulnar edge of the splint shell, whereby the proximal portion can move relatively independently of the distal portion while both the proximal and distal portions maintain alignment of the ulnar edge with the ulna of the forearm during supination and pronation.

9. (original) The orthopedic appliance described in claim 8, further comprising a transverse tab extending proximally from the distal portion a distance generally along the path of the transverse strap and along the radial edge, the transverse tab providing a fulcrum for the transverse strap during supination and pronation of the forearm.

10. (original) The orthopedic appliance described in claim 3, wherein the forearm component further comprises the following:

a. a dorsal gap on the dorsal portion, the dorsal gap extending distally a distance from the proximal end and terminating a distance from the distal end, the dorsal gap defining an ulnar portion and a radial portion, the ulnar and radial portions each

extending a distance from the proximal end of the splint shell and unconnected along the distance; and

b. a dorsal strap extending over the dorsum of the forearm and spanning the dorsal gap, the dorsal strap having a first end fixedly connected to the ulnar portion and a second end fixedly connected to the radial portion,

whereby the radial and the ulnar portions move independently within the confines of the dorsal strap.

11. (original) The orthopedic appliance described in claim 10, wherein the forearm component further comprises a reverse transverse strap extending from a point on the splint shell which is proximate to the proximal end and the radial edge transversely across the volar forearm to a point on the splint shell which is proximate to the distal end and the ulnar edge, the reverse transverse strap being releasably secured, whereby the reverse transverse strap maintains alignment of the ulnar edge of the splint shell with the ulna of the forearm during supination and pronation.

12. (original) The orthopedic appliance described in claim 11, wherein the biasing means is a continuous wire from which the supporting end and the torquing end are composed with a middle segment therebetween, the torquing end positioned along the ulnar side of the forearm and hand, the torquing end having at least two adjoining coils fabricated along the length of the torquing end, the adjoining coils positioned laterally to the distal forearm/carpal and the carpal/metacarpal joints and slightly dorsal to the axis of the carpus, the middle segment passing over the dorsum of the forearm, the supporting end positioned along the radial side of the forearm in attachment with the radial portion, the middle segment serving as an axis of rotation for the supporting end and the torquing end, the reverse transverse strap controlling the dorsal attitude of the torquing end through tension applied to the radial portion and therefore the supporting end.

13. (original) The orthopedic appliance described in claim 12, wherein a first obtuse angle is formed between the middle segment and the supporting end and a second

obtuse angle is formed between the middle segment and the torquing end, whereby the torquing end provides both a force resisting volar glide and simultaneously a slight force promoting ulnar deviation as tension is volarly increased against the supporting end by the reverse transverse strap.

14. (original) The orthopedic appliance described in claim 1, wherein the biasing means comprises a spring having an axis associated with the supporting end, the spring being undamped, the supporting end attached to the forearm component and alignable with the ulnar side of the forearm while the axis is distally positioned on the ulnar side of the forearm, the torquing end attached to the ulnar side of the palmar component to provide torque opposing volar movement of the palmar component at substantially 20° of dorsiflexion or less, the supporting end maintaining orientation of and stabilizing the biasing means along the ulnar aspect of the forearm during supination and pronation.

15. (original): The orthopedic appliance described in claim 14, wherein the axis of the spring is approximately positioned on the ulnar side of the distal forearm/carpal and carpal/metacarpal joints and slightly dorsal to the axis of the carpus, whereby an elliptical arc is formed that maintains placement of the palmar component throughout extension and flexion of the hand.

16. (original): An orthopedic appliance adapted to be worn on a forearm and a hand of a person exhibiting symptoms of carpal tunnel syndrome, the appliance comprising:

a. a palmar component sized for attachment to the carpal-metacarpal complex of the hand;

b. a biasing component alignable with the ulnar side of the forearm, the biasing component formed of a continuous wire with a supporting end and a torquing end, the torquing end coupled to the palmar component and having a plurality of adjoining coils formed along its length; and,

c. a forearm component sized and configured to be rigidly and removably attached to the forearm, the forearm component providing a stable platform for the

supporting end and maintaining alignment of the torquing end with the ulnar side of the carpal-metacarpal complex during movement of the forearm and hand, the coils disposed thereby to apply a dorsally-directed force to the hand.

17. (original) The orthopedic appliance described in claim 16, wherein the plurality of adjoining coils are positioned laterally to the distal forearm/carpal and the carpal/metacarpal joints and slightly dorsal to the axis of the carpus.

18. (original) The orthopedic appliance described in claim 16, wherein the forearm component is comprised of:

5 a. a splint shell substantially conforming to the dorsum and sides of the forearm, the splint shell having a distal end, a proximal end, an ulnar edge between the distal end and the proximal end, a radial edge between the distal end and the proximal end, and a dorsal portion extending from the distal end to the proximal end and between the radial edge and the ulnar edge; and,

b. a shell securing means for removably securing the splint shell to the forearm.

19. (original) The orthopedic appliance described in claim 18, wherein the splint shell is composed of a semi-rigid material.

5 20. (original) The orthopedic appliance described in claim 18, wherein the shell securing means comprises a transverse strap extending from a point on the splint shell which is proximate to the proximal end of the ulnar edge transversely across the volar forearm to a point on the splint shell which is proximate to the distal end of the radial edge, the transverse strap being releasably secured, whereby the transverse strap maintains alignment of the ulnar edge of the splint shell with the ulna of the forearm during supination and pronation.

21. (original) The orthopedic appliance described in claim 20, wherein the splint shell further comprises a radial gap extending from the radial edge a distance into the dorsal portion, the radial gap defining a proximal portion and a distal portion connected only along the ulnar edge of the splint shell, whereby the proximal portion can move relatively independently of the distal portion while both the proximal and distal portions maintain alignment of the ulnar edge with the ulna of the forearm during supination and pronation.

22. (original) The orthopedic appliance described in claim 21, further comprising a transverse tab extending proximally from the distal portion a distance generally along the path of the transverse strap and along the radial edge, the transverse tab providing a fulcrum for the transverse strap during supination and pronation of the forearm.

23. (original) The orthopedic appliance described in claim 18, wherein the shell securing means comprises a reverse transverse strap extending from a point on the splint shell which is proximate to the proximal end and the radial edge transversely across the volar forearm to a point on the splint shell which is proximate to the distal end and the ulnar edge, the reverse transverse strap being releasably secured, whereby the reverse transverse strap maintains alignment of the ulnar edge of the splint shell with the ulna of the forearm during supination and pronation.

24. (original) The orthopedic appliance described in claim 23, wherein the forearm component further comprises the following:

a. a dorsal gap on the dorsal portion, the dorsal gap extending distally a distance from the proximal end and terminating a distance from the distal end, the dorsal gap defining an ulnar portion and a radial portion, the ulnar and radial portions each extending a distance from the proximal end of the splint shell and unconnected along the distance; and

b. a dorsal strap extending over the dorsum of the forearm and spanning the dorsal gap, the dorsal strap having a first end fixedly connected to the ulnar portion and a second end fixedly connected to the radial portion,

whereby the radial and the ulnar portions move independently within the confines of the dorsal strap.

25. (original) The orthopedic appliance described in claim 24, wherein the biasing component further comprises a middle segment connecting the supporting end and the torquing end, the torquing end positioned along the ulnar side of the forearm and hand, the middle segment passing over the dorsum of the forearm, the supporting end positioned along the radial side of the forearm in attachment with the radial portion, the middle segment serving as an axis of rotation for the supporting end and the torquing end, the reverse transverse strap adjustably controlling the dorsal attitude of the torquing end through tension applied to the radial portion and therefore the supporting end.

26. (original) The orthopedic appliance described in claim 25, wherein a first obtuse angle is formed between the middle segment and the supporting end and a second obtuse angle is formed between the middle segment and the torquing end, whereby the torquing end provides both a force resisting volar glide and simultaneously a slight force promoting ulnar deviation as tension is volarly increased against the supporting end by the reverse transverse strap.

27. (original) An orthopedic appliance adapted to be worn on a forearm and a hand of a person exhibiting symptoms of carpal tunnel syndrome, the appliance comprising:

a. a palmar component sized for attachment to the carpal-metacarpal complex of the hand, the palmar component comprising:

i. an ulnar gutter clasp having a dorsal end and a palmar end, the ulnar gutter clasp being sized and configured to the hand such that the dorsal end extends from the ulnar side of the hand to approximately the midpoint of the dorsal side of the hand and the palmar end extends from the ulnar side of the hand to approximately the midpoint of the palm;

ii. a palmar strap having a fixed end and a attachable end, the fixed end permanently secured to the palmar end of the ulnar gutter clasp, the attachable



end passing from the palmar end across the thenar web between the thumb and forefinger to the dorsal end and being removably secured to the dorsal end so as to secure the ulnar gutter clasp firmly to the ulnar side of the hand, and

15                                   iii.       a connection means fixedly attached to the ulnar gutter clasp at a point proximal to the ulnar side of the hand;

                                  b.       a biasing component alignable with the ulnar side of the forearm, the biasing component formed of a continuous wire with a supporting end and a torquing end, the torquing end coupled to the connection means of the palmar clasp, the torquing end  
20       having a plurality of adjoining coils formed along its length; and,

                                  c.       a forearm component sized and configured to be rigidly and removably attached to the forearm, the forearm component providing a stable platform for the supporting end and maintaining alignment of the torquing end with the ulnar side of the carpal-metacarpal complex during movement of the forearm and hand, the coils disposed  
25       thereby to apply a dorsally-directed force to the hand.

28.   (original) A method of relieving the pain associated with carpal tunnel syndrome and increasing the carpal volume through use of an appliance sized and configured to a forearm and a hand of an individual person manifesting pain, the appliance having a forearm component, a palmar component, and a biasing component formed of a  
5       wire having a supporting end, a torquing end, and a plurality of adjacent coils formed therebetween, the method operating to relieve contractures of the volar carpal ligaments and to restore the cocontraction ratio between the flexor and extensor muscle tendons of the forearm, without interfering with normal activities of daily living, the method comprising the steps of

10                           a.       releasably attaching the forearm component in fixed relation to the dorsal side of the forearm, the forearm component serving to position the supporting end of the biasing component in fixed relationship to the ulnar side of the forearm;

                                  b.       releasably attaching the palmar component of the appliance in fixed relationship to the ulnar side of the hand associated with the forearm upon which the

- 15 forearm component is positioned, so that the palmar component permits free movement of the hand during normal activities of daily living;
- c. fixedly connecting the torquing end of the biasing component to the ulnar side of the palmar component;
  - d. positioning the coils of the biasing component adjacent to the ulnar  
20 side of the ulnar-radial/metacarpal and intra-metacarpal joints;
  - e. Adjusting the biasing component to support the hand at about 20 dorsiflexion where no force is exerted upon the metacarpal complex of the hand by the biasing component;
  - f. adjusting the biasing component to provide low level resistance against  
25 dorsally- or volarly-directed volitional hand movement diverging from the 20 dorsiflexion point;
  - g. maintaining alignment of the biasing component in the position on the ulnar side of the ulnar-radial/metacarpal and intra-metacarpal joints during supination and pronation of the forearm and during ulnar/radial deviation of the carpal-metacarpal complex;  
30 and
  - h. permitting unobstructed flexion of the fingers and opposition of the thumb with the fingers.